APPENDIX H
RECOVERY TECHNIQUES

If an M1059 is disabled, gets stuck, or will not start, the squad must get it moving as quickly as possible. A stationary vehicle is vulnerable to direct, indirect, and air-delivered munitions. This appendix covers towing a disabled M1059, starting it by towing or using a slave cable, retrieving it if it is stuck in mud or immobilized on an obstacle, safety considerations for recovery operations, and how to disable the vehicle if it has to be abandoned. For additional techniques, see FM 20-22.

Because the immobilized M1059 is such a vulnerable target, personnel not involved in the recovery should be in position to provide security. The caliber .50 machine gunner should stay at his station and be ready to engage targets as required. Squad members picked to provide local security should dismount and be stationed away from the vehicle.

If the vehicle cannot be recovered quickly, the platoon leader may decide to redistribute men and equipment among the other vehicles. The driver and caliber .50 machine gunner may be left with the disabled vehicle to wait for help, or the vehicle may have to be abandoned if the enemy situation warrants.

TOWING

The M1059 may have to be towed when disabled or stuck or to start its engine. The M1059 is equipped with towing eyes and shackles on the front and a tow pintle in the rear of the vehicle. (See figure H-1.) It also has a tow cable stowed on the outside of the rear ramp.

Normally, the terrain or enemy situation will dictate the way to tow the M1059. When not exposed to enemy fire, either the highway or the cross-country tow may be used. When exposed to enemy fire, the combat tow is used. Before any towing hookup is begun, the master switch should be OFF, the laterals locked, and the range selector placed at N (neutral). Once all connections for towing have been made, the laterals are released.

TOWING TECHNIQUES

Highway Tow

When towing an M1059 on a highway, it is best to use a recovery vehicle and the recovery vehicle's tow bar. If a recovery vehicle is not available, another M1059 may be used. Attach the tow bar to the front towing eyes of the disabled vehicle. When a tow bar is used, a driver is not required in that towed vehicle. When recovery is to be at speeds of less than 10 mph and distances are less than 30 miles, place the range selector in the N range. When anticipated recovery exceeds 10 mph and 30 miles in distance, the universal joints between final drives and differential must be removed before towing can begin. (See figure H-2.)

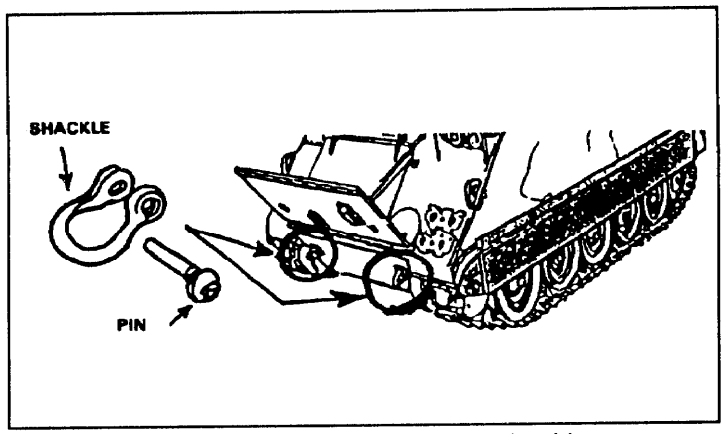

Figure H-1. Towing eyes and shackles.

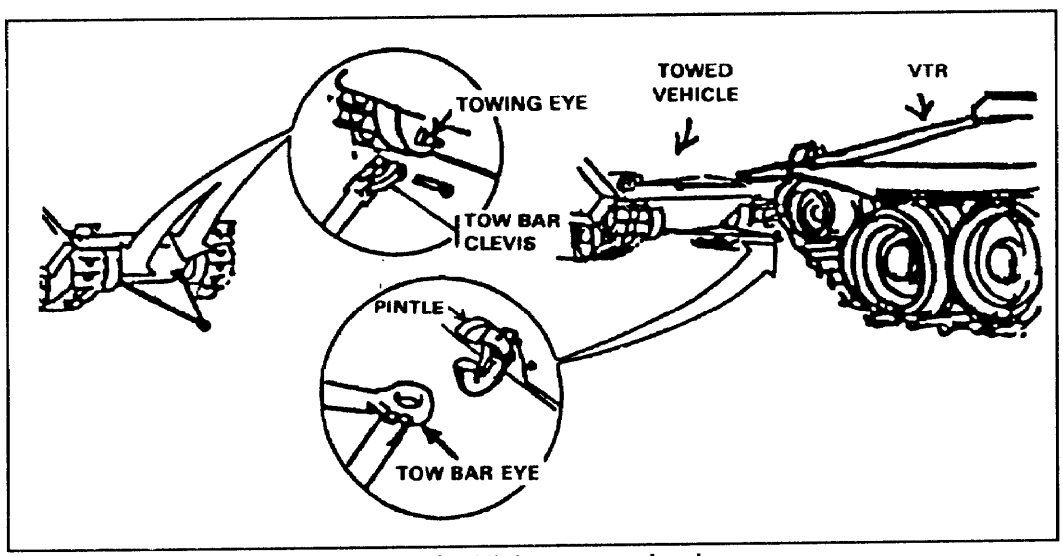

Figure H-2. Highway tow hookup.

Cross-Country Tow

To tow a vehicle cross-country, use two cables. It is best to cross the cables in an X position to keep the two vehicles aligned. To tow the vehicle forward, attach the cables to the front eyes of the disabled vehicle and the rear eyes of the towing vehicle. The vehicle may also be towed moving backward. A driver is required in the towed vehicle to apply the brakes to prevent it from overrunning the recovery vehicle on downgrades or when stopping. Never tow an M1059 with a cable when its universal joint is disconnected; the driver will have no braking or steering ability. (See figure H-3.)

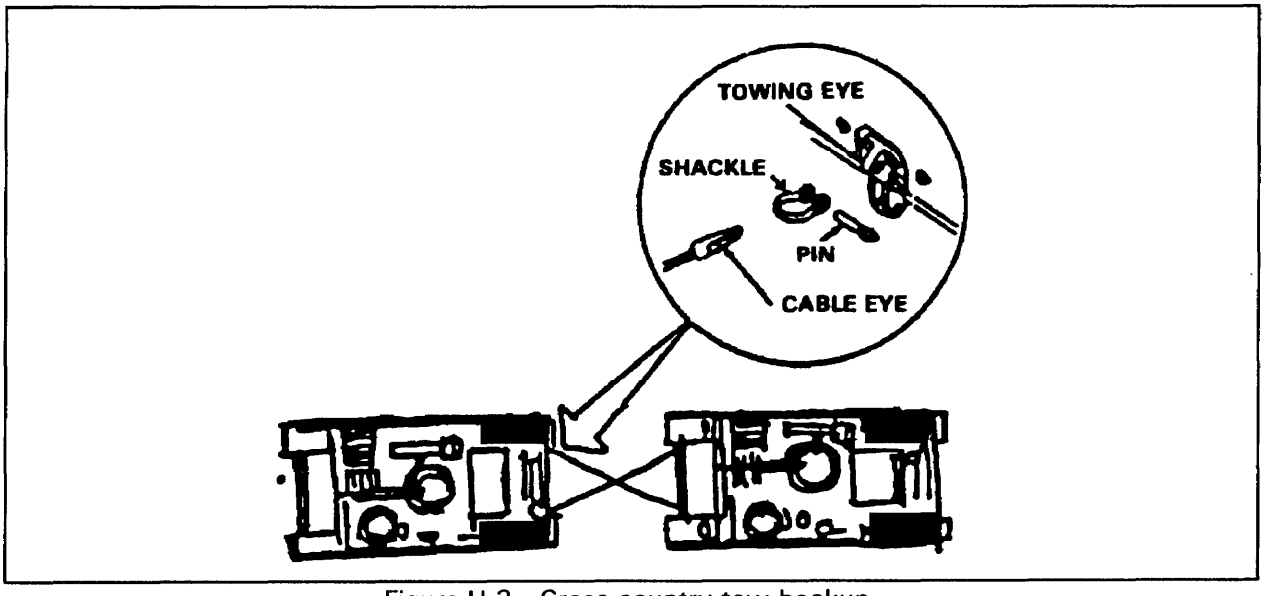

Figure H-3. Cross-country tow hookup.

Combat Tow

When it is necessary to make a towing connection under fire, use the combat tow by a recovery vehicle to minimize exposure of personnel. Attach a tow bar or tow cable to the recovery vehicle's tow pintle before the vehicle moves to the disabled vehicle. Then move the recovery vehicle into the area and back up as close as possible to the back of the M1059, while still allowing the ramp door to open. One soldier then connects the free end of the V-chain or tow cable to the rear tow pintle. (Smoke grenades can be used during the hookup to minimize the exposure of the vehicles and personnel to fire.) After hookup, close the ramp door and move the recovery vehicle out with the disabled M1059 in tow. This method may be used with either the APC or another recovery vehicle. As with a cross-country tow, a driver is required to operate the brakes of the towed vehicle. The towed vehicle's range selector must be placed in N. (See figures H-4 and H-5.)

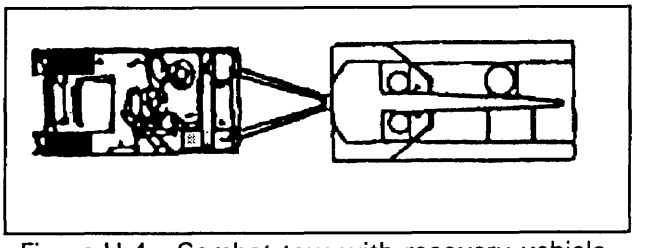

Figure H-4. Combat tow with recovery vehicle.

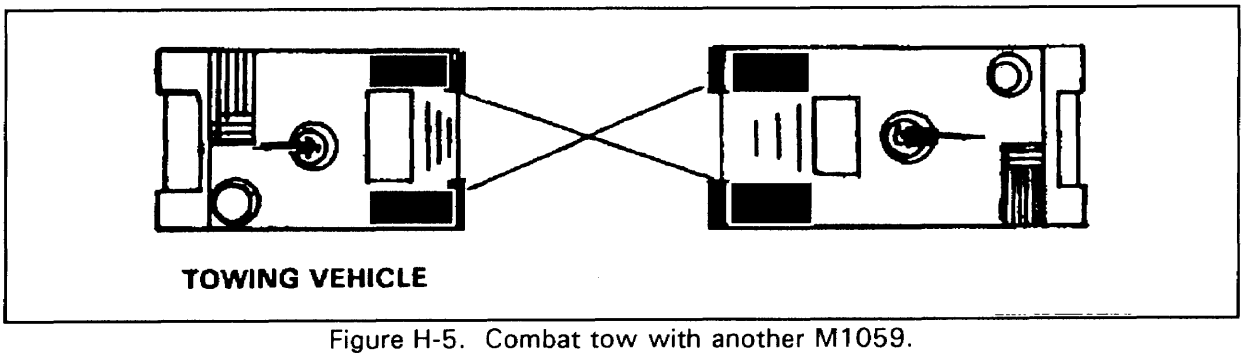

Figure H-5. Combat tow with another M1059.

Tow Starting

When an M1059 cannot be started using a slave cable, it may be started by towing. After securely attaching a tow vehicle to the disabled vehicle and doing all the before-operation preventive maintenance checks and services (TM 9-2300-257-10), the master power switch is on and fuel shut-off is pushed in. With the transmission range selector in N, release the M1059 brake levers and tow it forward until its speed reaches 20 to 25 mph. The driver then moves the transmission range selector to the 1-3 position and presses the accelerator about halfway. (See figure H-6.)

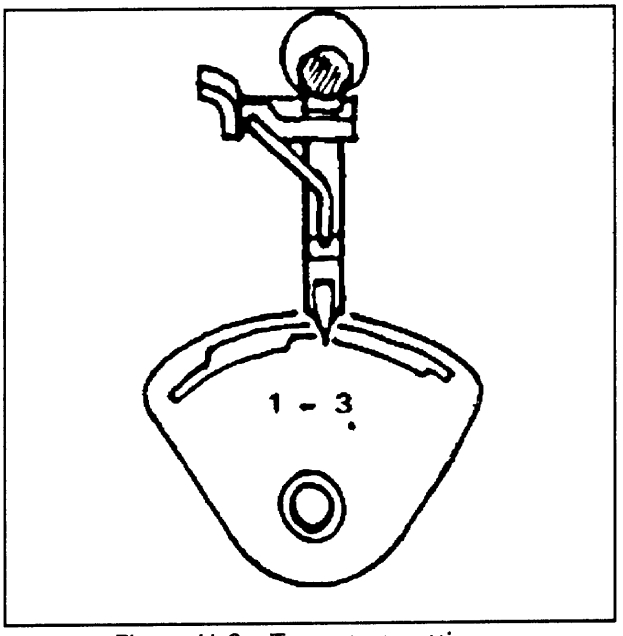

Figure H-6. Tow start settings.

When the engine starts, the driver moves the transmission range selector to N range. The driver should signal the towing vehicle with his horn or by visual signal so that both vehicles can be brought to a stop. The cables or tow bar are then disconnected.

The vehicle should not be left in any driving range for more than 5 seconds while towing. If the engine does not start, shift back to N for a few seconds before trying again. If the engine will not start in three tries, notify the maintenance contact team.

STARTING VEHICLE WITH SLAVE CABLE

When the vehicle's battery is dead or missing, the engine can be started using a slave cable connected to any 24-volt DC power source.

Before the slave cable is connected, the master switch on both vehicles must be off. The slave cable is connected to the slave receptacle in the driver's compartment.

Once the slave cable is connected and both vehicles have turned on the master switches, the engine can be started in the same way as with its own batteries. When the engine starts, it should be left running while the slave cable is disconnected. The same process can be used to start another vehicle with the M1059 as the 24-volt DC outside power source. (See figure H-7.)

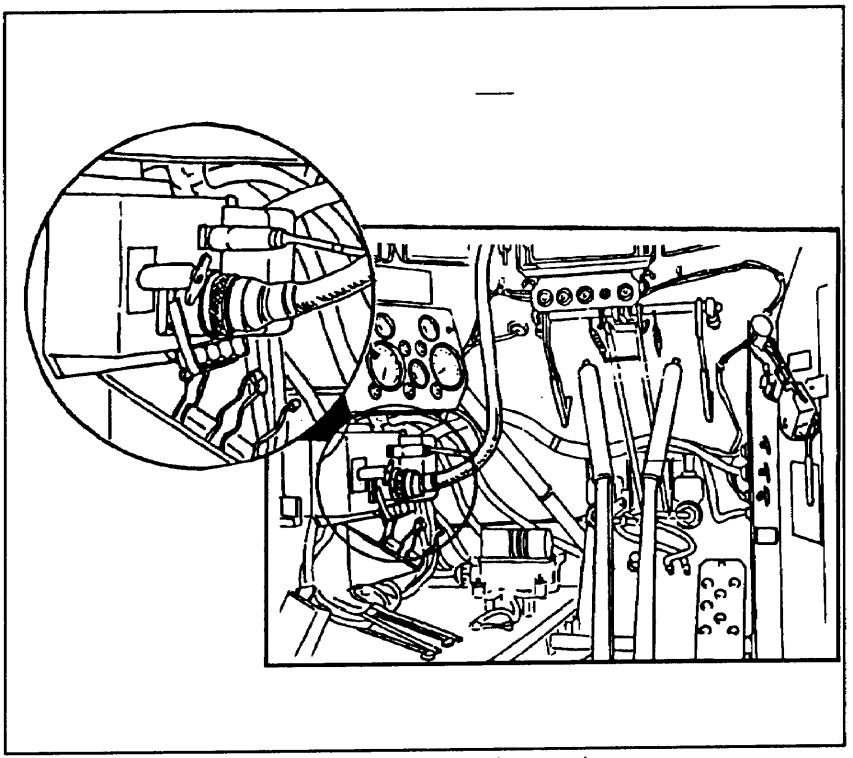
Figure H-7. Slave cable starting.

RECOVERY

Vehicles often become bellied (high centered) on high stumps, rocks, ridges, or mire. In this position, the M1059 has no traction and is stuck.

VEHICLE BELLIED IN MIRE

To recover a vehicle stuck in mire, a log should be obtained that is long enough to space the width of the vehicle and large enough to support the vehicle's weight. Two cables are used to attach the log to the tracks, one on each track. Place the log against both tracks. Place the tow cable so that one end of the cable goes over the log and through one track from the inside. Place the other end of the tow cable is placed underneath the log. Connect the ends of the cable with a towing shackle and pin. The cable should be connected on the outside of the track for easy disconnecting. Use the same method to attach the log to the track on the other side of the vehicle.

By gradually applying power to the tracks, the slack in the cables will be taken up, pulling the log underneath the tracks until it contacts the mire, and anchors the tracks, letting the vehicle move. (See figures H-8 and H-9.)

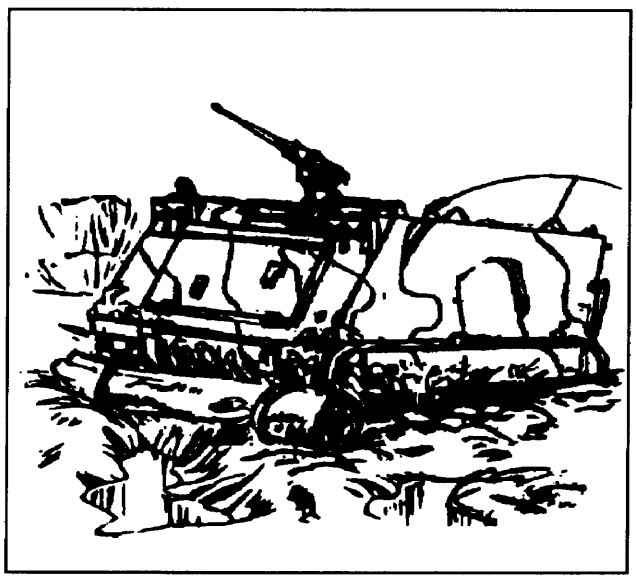

Figure H-8. Mired M1059 recovery.

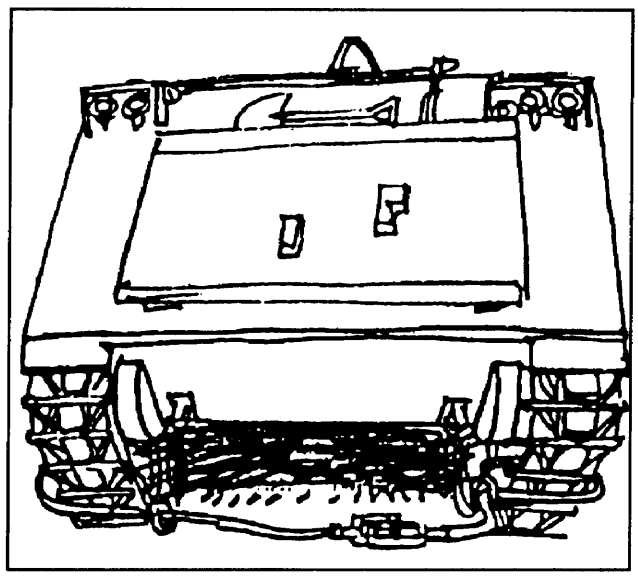

Figure H-9. Anchoring tracks.

CAUTION
TO PREVENT DAMAGE TO THE TOW CABLES AND TRACKS, STOP THE VEHICLE BEFORE THE LOG REACHES THE FENDERS IN THE FRONT OR REAR OF THE M1059.

VEHICLE BELLIED ON HIGH STUMPS, ROCKS, OR RIDGES

For a bellied disablement other than mire, the tracks can be anchored using just the two tow cables. Hook the tow cables together, attach to both tracks by passing the ends of the cables through the tracks from the outside, and attach them together in the center with towing shackles and pins.

When power is applied to the tracks, the cable will contact the obstacle and anchor the tracks. The same caution applies- -stop the vehicle before the cables reach the fenders.

NOTE

If all methods listed above fail to free the vehicle,the leader must call for the M578 from the recovery section.

RECOVERY KITS

Capstan Kit

Capstan kit (NSN 2540-00-933-3570) can be used to ease the M1059 over steep or slippery banks and to ease the M1059 over steep or slippery banks and through boggy areas. If the M1059 does not have a kit, one can be ordered using the national stock number. The kit has two adapters permanently bolted to the hub of each driver sprocket, two capstan drums (bolted on each adapter [with a T-bolt]), four 100-foot and two 50-foot lengths of l-inch nylon rope with shackles, and two marine anchors with recovery cables.

To use the kit--

- Bolt drums with T-bolts to the adapters, making sure that laterals are locked.
- Thread a length of rope through the outside flange of each drum.
- Make two or three turns over the end of the rope to anchor it, being sure that the rope extends from under the drums.
- Set the marine anchors in line with the drums and press them into the ground to give them a good start.
- Eliminate all rope slack before attaching the ropes to the anchors.
- Apply vehicle power slowly until the tracks are turning equally. Keep a slow, steady, equal pull so that the anchors will dig in evenly.
- As the drums winch the ropes, the M1059 will move out. Use a guide to make sure that the rope winds up properly.

The anchors can be used side-by-side or in tandem. Because the anchors may go underground, be sure to attach the recovery cables to them before pulling. Recover the anchors by pulling the recovery cables with the M1059.

APCAT KIT

The APCAT (APC anchoring tracks) kit is another handy self-recovery aid. It is locally fabricated and consists of two track anchor blocks and two 100-foot lengths of rope. (See figure H-10.)

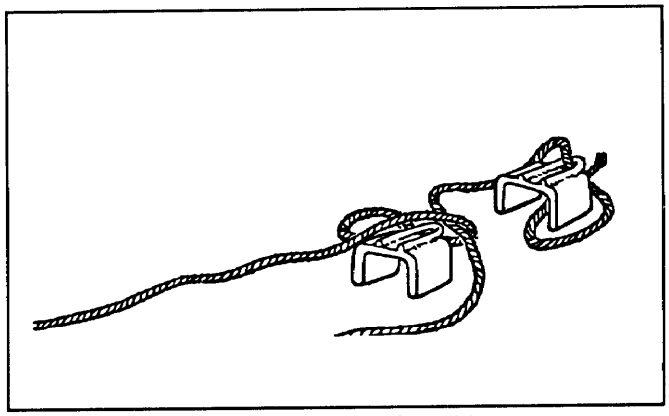

Figure H-10. APCAT kit.

To use the kit, attach an anchor block on each track and tie the rope to the loops on the blocks and then to a good anchor.

As the driver applies vehicle power, the tracks anchor themselves to the blocks while the vehicle moves out the length of the track. The blocks can then be retied to the ropes with a half-hitch and the process repeated. (See figure H-11.)

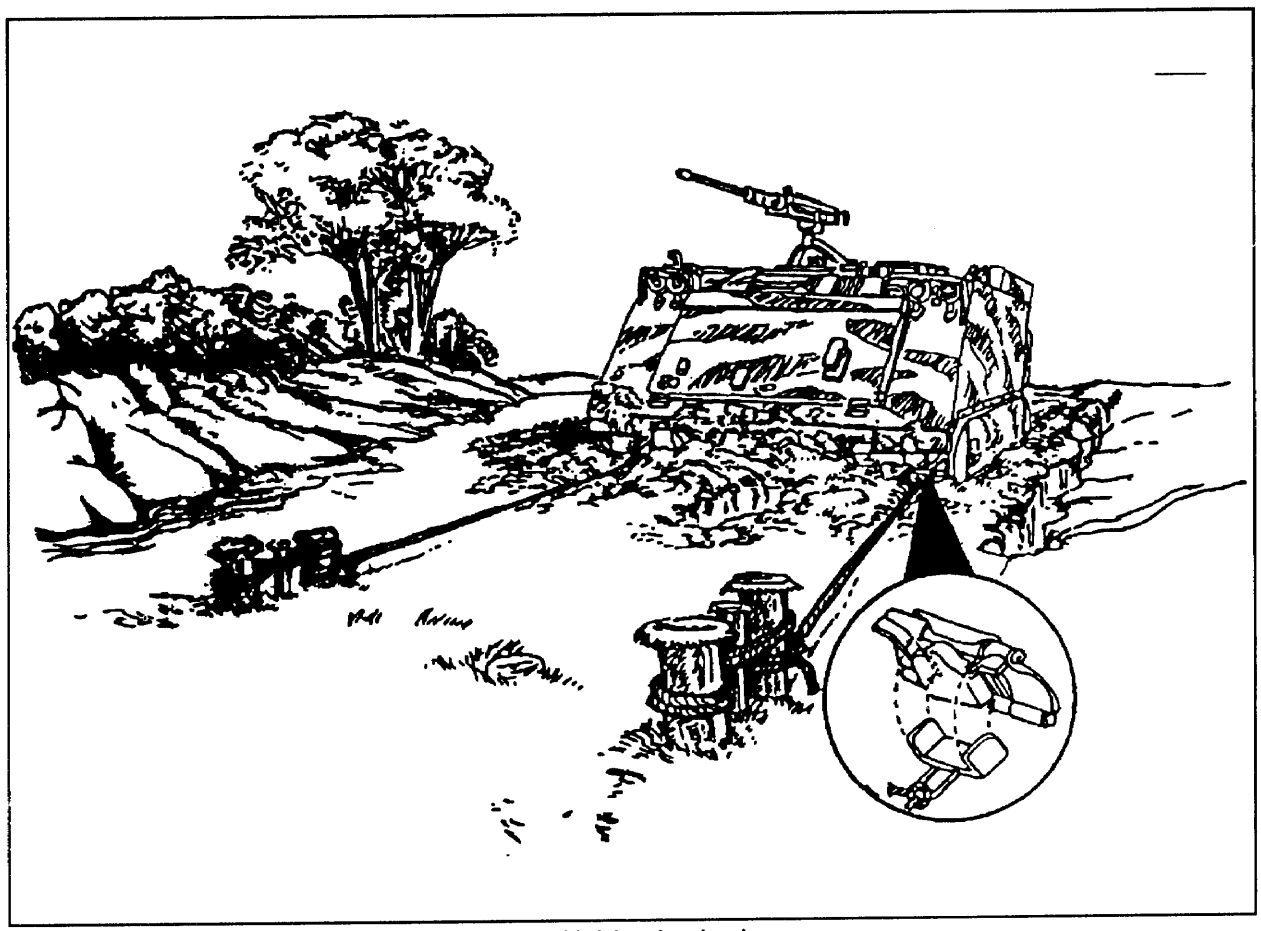

Figure H-11. Anchoring.

SAFETY

Recovery operations are dangerous. Maximum care must be taken to prevent injury to personnel and damage to the vehicle and equipment. Listed below are general safety precautions to consider before trying any recovery operations.

HANDLING CABLES

Personnel handling wire ropes or cable should wear heavy leather-palmed gloves to prevent hand injuries or cuts from broken or frayed wires. A moving cable should never be allowed to slide through the hand, even if gloves are worn. (See figure H-12.)

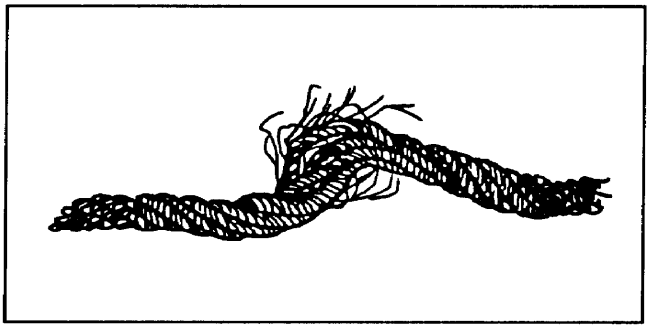

Figure H-12. Frayed cable.

CARE OF CABLES

Cables should not be drawn over rocks or around sharp corners. Heavy objects should not be dropped on a cable. They could nick or burr the wires, causing them to break. All loops formed in a cable should be removed before force is applied.

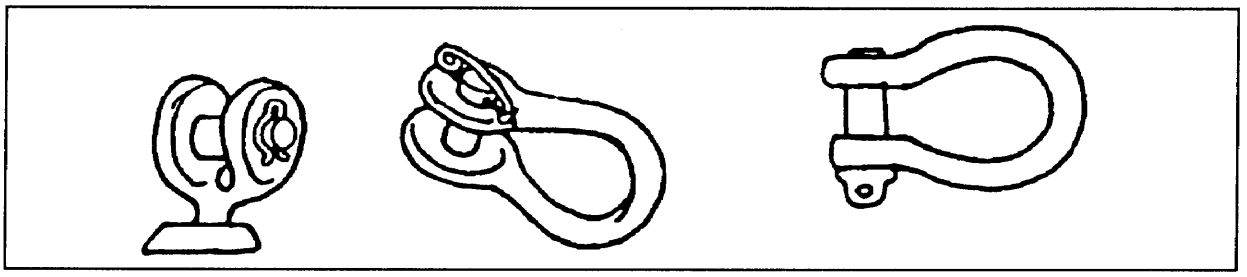

Figure H-13. Use of hooks.

SAFETY KEYS

All safety keys or pins should be in place before force is applied.

HOOK POSITIONS

If a hook is used to pull the vehicle, the open part (throat) should point upward. If the hook should straighten out from overload, the rigging will tend to go downward, not upward unrestrained.

RIGGING BETWEEN VEHICLES

When erecting rigging between vehicles, engines must be off and vehicle brakes applied to prevent possible injury to rigging personnel or damage to vehicles.

INSPECTING RIGGED EQUIPMENT

Equipment should be thoroughly inspected before the recovery operation starts. The recovery vehicle operator should be directed to work the winch enough to remove slack from the rigging, then stop the operation and shut off all engines. The rigging can then be inspected without endangering the personnel. Likewise, if a vehicle is being towed, power should be applied slowly until all tow cable slack is taken up. Again, shut off engines and inspect rigging before going on.

OPERATOR/DRIVER SAFETY

Operators and other personnel, in both the recovery vehicle and disabled vehicle, should keep their hatches closed during a recovery operation and use their periscopes to see hand signals.

SAFE LOCATION OF PERSONNEL

Before a pull starts, all personnel on the ground must be directed to move safely away from rigging before the operators apply power. A taut cable, released by a sudden break, can backlash and cut a person in half. The minimum safe distance is one and a half times the length of the longest line.

For safe control of a recovery operation, there should be only one signalman. The operators must know the meaning of signals used and must act only on those signals. The signalman must be in a safe place where the operators can observe his signals.

ABANDONING THE M1059

Every effort should be made to recover a disabled M1059. If the enemy situation is so critical that the vehicle cannot be recovered, men and equipment may have to be crossloaded on other vehicles and the disabled M1059 abandoned. An abandoned M1059 should be of no immediate use to the enemy and yet should be readily repairable by friendly forces.

If the carrier is to be abandoned, secure the weapons, radios, and equipment, and take one of the following actions:

- Remove the fuel line from the fuel filter to the engine block.
- Remove the shaft between the transmission and differential.
- Break a track and remove at least two shoes.

In an extreme situation, place a thermite grenade on the top of the engine. TM 9-2300-257-20 has detailed information on the destruction of the M1059.

DECISION TO ABANDON M1059

The decision to abandon a vehicle is the responsibility of the platoon leader or senior man present. The M1059 should be stripped of all equipment possible and the M1059's location reported to the next higher headquarters as covered in the SOP.